



COURSE OVERVIEW IE0360

Certified SIL Professional: Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) & Emergency Shutdown (ESD) {IEC 61511 & IEC 61508}: Functional Safety

Course Title

Certified SIL Professional: Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) & Emergency Shutdown (ESD) {IEC 61511 & IEC 61508}: Functional Safety



Course Date/Venue

November 03-07, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

IE0360



Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

The course will help the participants to improve compliance and reduce costs by guiding them through the development of the safety system including safety system layout, product selection and safety analysis to help them meet machinery safety performance level (PL) requirements as outlined by global standard (EN) ISO 13849-1.



The operation of many industrial processes, especially those in the chemical or oil & gas industries, involve inherent risk due to the presence of dangerous chemicals or gases. Safety Instrumented Systems (SIS) are specifically designed to protect personnel, equipment, and the environment by reducing the likelihood or the impact severity of an identified emergency event. Explosions and fires account for millions of dollars of losses in the chemical or oil & gas industries each year. Since a great potential for loss exists, it is common for industry to employ Safety Instrumented Systems (SIS) to provide safe isolation of flammable or potentially toxic material in the event of a fire or accidental release of fluids.





IEC 61511 has been developed as a Process Sector implementation of the international standard IEC 61508: “Functional safety of electrical / electronic / programmable electronic safety-related systems.” The standard has two concepts, which are fundamental to its application; the safety lifecycle and safety integrity levels (SIL). The safety lifecycle forms the central framework which links together most of the concepts in this international standard.

It is a good engineering procedure for safety instrumented system (SIS) design. In the safety lifecycle, process risks are evaluated and SIS Performance requirements are established (availability and risk reduction). Layers of protection are designed and analyzed. Finally, a SIS (if needed) is optimally designed to meet the particular process risk. Safety integrity levels are order of magnitude levels of risk reduction. There are four SIL's defined in this standard, just as in IEC 61508. SIL1 has the lowest level of risk reduction. SIL4 has the highest level of risk reduction. The standard suggests that applications which require the use of a single safety instrumented function of SIL 4 are rare in the process industry and that they shall be avoided where reasonably practicable. The standard is primarily concerned with safety-instrumented systems for the process industry sector (sensors, logic solvers and final elements are included as part of the safety instrumented system). It also deals with the interface between safety-instrumented systems and other safety systems in requiring that a process hazard and risk assessment be carried out.

This course will explain the basic concepts, definitions and commonly used terms in Safety Instrumented Systems and provide a basic understanding of SIS related concepts.

Further, the course discusses the fundamentals of ANSI/ISA 84.00.01-2004 Parts 1-3 (IEC 61511 modified). The course content is designed to provide the participant with an understanding of how to implement the requirements of the safety instrumented system (SIS) standards, to perform layers of protection analysis, to create a design to meet the safety integrity level (SIL), and to verify that the SIL has been achieved. It will also introduce the participant to the guidance contained in draft technical report, ISA TR84.00.04, which concerns implementation of ANSI/ISA 84.00.01-2004.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Get Certified as a “*Certified SIL Professional*”
- Apply a comprehensive knowledge in Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) and Emergency Shutdown Systems (ESD) covering functional safety
- Emphasize the safety instrumented system management responsibilities and interpret the applicable safety standards such as IEC 61508, IEC 61511, ANSI/ISA S84.01
- Identify the phases of the safety life cycle and determine the safety requirement specification
- Carryout the various process hazard analysis namely the fault tree analysis, event tree analysis & FMEA and heighten awareness on HAZOP study



- Use a system approach on safety instrumented systems including its function and level and improve SIL determination using the ALARP method, semi quantitative methods, safety layer matrix method, risk graph method and LOPA Method
- Acquire knowledge on SIL verification and validation using a structured approach and review and improve SIS documentation
- Perform proof testing on SIS and ESD in process industry and conduct diagnostic procedures and partial valve stroking
- Perform the process of selecting sensors, final elements and logic solvers and discuss safety software models including their application
- Employ the operation and maintenance of SIS and ESD following the guidelines and procedures on planning and implementation
- Recognize the importance of SMART Safety Instrumented Systems including the intelligent field devices, digital communications, smart logic solvers and complete loop solution and implement SMART SIS

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides a complete and up-to-date overview of safety instrumented systems (SIS), safety integrity level (SIL) and emergency shutdown (ESD) for those in charge of functional safety. The course is also aimed at those involved in analyzing and controlling the ESD and those involved in the process safety, SIS, SIL, SIF, process control, process instrumentation and functional safety in process plants.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.





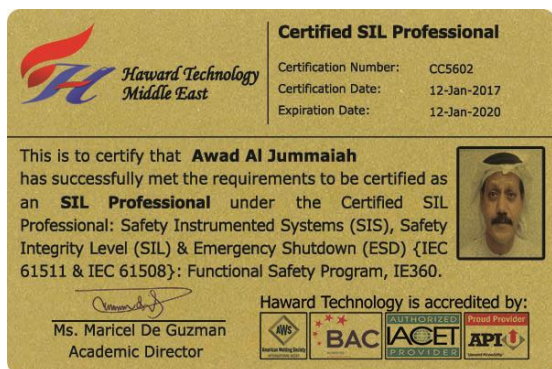
Course Certificate(s)

(1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Successful candidate will be certified as a "Certified SIL Professional". Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-





- (2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

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Haward Technology Middle East
Continuing Professional Development (HTME-CPD)

CEU Official Transcript of Records

TOR Issuance Date: 12-Jan-17
HTME No.: PAR213881
Participant Name: Aawad Al Jummaiah

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
IE360	Certified SIL Professional: Safety Instrumented Systems (SIS), Safety Integrity Level (SIL) & Emergency Shutdown (ESD) (IEC 61511 & IEC 61508): Functional Safety	January 08-12, 2017	30	3.0

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 Standard.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking Continuing Education Units (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology is accredited by

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | Fax: +971 2 3091 716 | E-mail: info@haward.org | Website: www.haward.org

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -


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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.



Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Sydney Thoresson, PE, BSc, is a **Senior Electrical & Instrumentation Engineer** with over **40 years** of extensive experience within the **Petrochemical, Utilities, Oil, Gas and Power** industries. His specialization highly evolves in **Process Control Instrumentation, Process Instrumentation & Control, Process Control, Instrumentation, Troubleshooting & Problem Solving, Instrumentation Engineering, Process Control (PCI) & Safeguarding, Instrument Calibration & Maintenance, Instrumented Safety Systems, High Integrity**

Protection Systems (HIPS), Process Controller, Control Loop & Valve Tuning, Compressor Control & Protection, Control Systems, Programmable Logic Controllers (PLC), SCADA System, PLC & SCADA - Automation & Process Control, PLC & SCADA Systems Application, Technical DCS/SCADA, PLC-SIMATIC S7 300/400: Configuration, Programming and Troubleshooting, PLC, Telemetry and SCADA Technologies, Cyber Security of Industrial Control System (PLC, DCS, SCADA & IED), Basics of Instrumentation Control System, DCS, Distributed Control System - Operations & Techniques, Distributed Control System (DCS) Principles, Applications, Selection & Troubleshooting, Distributed Control Systems (DCS) especially in Honeywell DCS, H&B DCS, Modicon, Siemens, Telemecanique, Wonderware and Adrioit, Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD), Emergency Shutdown System, Variable Frequency Drive (VFD), Process Control & Safeguarding, Field Instrumentation, Instrumented Protective Devices Maintenance & Testing, Instrumented Protective Function (IPF), Refining & Rotating Equipment, Equipment Operations, Short Circuit Calculation, Voltage Drop Calculation, Lighting Calculation, Hazardous Area Classification, Intrinsic Safety, Liquid & Gas Flowmetering, Custody Measurement, Ultrasonic Flowmetering, Loss Control, Gas Measurement, Flowmetering & Custody Measurement, Multiphase Flowmetering, Measurement and Control, Mass Measuring System Batching (Philips), Arc Furnace Automation-Ferro Alloys, Walking Beam Furnace, Blast Furnace, Billet Casting Station, Cement Kiln Automation, Factory Automation and Quality Assurance Accreditation (ISO 9000 and Standard BS 5750). Further, he is also well-versed in **Electrical Safety, Electrical Hazards Assessment, Electrical Equipment, Personal Protective Equipment, Log-Out & Tag-Out (LOTO), ALARP & LOPA Methods, Confined Workspaces, Power Quality, Power Network, Power Distribution, Distribution Systems, Power Systems Control, Power Systems Security, Power Electronics, Electrical Substations, UPS & Battery System, Earthing & Grounding, Power Generation, Protective Systems, Electrical Generators, Power & Distribution Transformers, Electrical Motors, Switchgears, Transformers, AC & DC Drives, Variable Speed Drives & Generators and Generator Protection. He is currently the **Projects Manager** wherein he manages projects in the field of electrical and automation engineering and in-charge of various process hazard analysis, fault task analysis, FMEA and HAZOP study.**

During Mr. Thoresson's career life, he has gained his thorough and practical experience through various challenging positions and dedication as the **Contracts & Projects Manager, Managing Director, Technical Director, Divisional Manager, Plant Automation Engineer, Senior Consulting Engineer, Senior Systems Engineer, Consulting Engineer, Service Engineer and Section Leader** from several international companies such as **Philips, FEDMIS, AEG, DAVY International, BOSCH, Billiton and Endress/Hauser**.

Mr. Thoresson is a **Registered Professional Engineering Technologist** and has a **Bachelor's degree in Electrical & Electronics Engineering** and a **National Diploma in Radio Engineering**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and an active member of the **International Society of Automation (ISA)** and the **Society for Automation, Instrumentation, Measurement and Control (SAIMC)**. He has further delivered numerous trainings, courses, seminars, conferences and workshops worldwide.





Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1 Sunday 03th of November 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introductions
0815 – 0830	PRE-TEST
0830 – 0900	Review of Course Table of Contents
0900 – 0930	Case Studies Bhopal Gas Tragedy • Piper Alpha Disaster • Chernobyl Catastrophe • Bruncefield Oil Depot Explosion
0930 – 0945	Break
0945 – 1030	Safety Standards Introduction • IEC 61508 • IEC 61511 • ISA S84 • Summary
1030 – 1130	Safety Instrumented Systems – Management Responsibilities Safety Management • Tolerable Risk • Risk Reduction • Risk Measurement • Risk Management • Layers of Production
1130 – 1215	Safety Life Cycle Introduction • Overview • Phases of the Safety Life Cycle • Safety Requirement Specification
1215 – 1230	Break
1230 – 1330	Process Hazard Analysis Introduction • HAZOP Study • Fault Tree Analysis • Event Tree Analysis • Failure Mode and Effects Analysis (FMEA)
1330 – 1420	Video Presentation – HAZOP
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2 Monday 04th of November 2024

0730 – 0930	Safety Instrumented Systems Introduction • Safety PLC • System Architecture • Summary
0930 – 0945	Break
0945 – 1100	Safety Instrumented Functions Definition • Example of a Safety Function • What a SIF Is • What a SIF Is Not • How SIF fits with SIS and SIL • Summary • Bibliography
1100 – 1215	Safety Integrity Level (SIL) Introduction • General • SIL application • Low Demand Mode vs Continuous Mode • Probability of Failure on Demand • Summary
1215 – 1230	Break
1230 – 1420	SIL Determination Summary • Introduction • Safety Integrity Level Concepts • ALARP Method • Semi Quantitative Methods • Safety Layer Matrix Method • Risk Graph Method • LOPA Method
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two





Day 3 Tuesday 05th of November 2024

0730 – 0930	SIL Verification & Validation Introduction • Verification • Validation • A Structured Approach • Test Planning • System Decomposition
0930 – 0945	Break
0945 – 1100	Integrated Fire & Gas Systems Introduction • Industry Safety Performance Standards • Components of a Good Fire & Gas System • Application • Conclusions
1100 – 1215	Proof Testing Diagnostics Proof Testing • Diagnostics • Partial Valve Stroking
1215 – 1230	Break
1230 – 1300	Selecting Sensors & Final Elements Introduction • Non-Essential Components • Certified or Proven • Probable Causes of Failure • Smart Field Instruments • Digital Valve Controller • General Requirements for Fail Safe Operations
1300 – 1420	Video Presentation HART Digital Communications
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

Day 4 Wednesday 06th of November 2024

0730 – 0830	Selecting Logic Solvers Preface • Introduction • Typical Specification • Technologies for Logic Solvers • Programmable Systems for Logic Solvers • Overall PLC Reliability • Major Systems • Summary
0830 – 0930	Video Presentation SIS Engineering
0930 – 0945	Break
0945 – 1100	SIS Software Introduction • Development Life Cycle • Certified Software Models • Asset Management Software • Summary
1100 – 1215	Operation & Maintenance Overview • Planning • Procedures • Operations • Maintenance • Predictive Maintenance • Summary
1215 – 1230	Break
1230 – 1420	SMART Safety Instrumented Systems Overview • Why it matters? • What is a Smart SIS? • Intelligent Field Devices • Digital Communications • Smart Logic Solvers • Complete Loop Solution • Lower Costs • Smart SIS Implementation
1420 - 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four



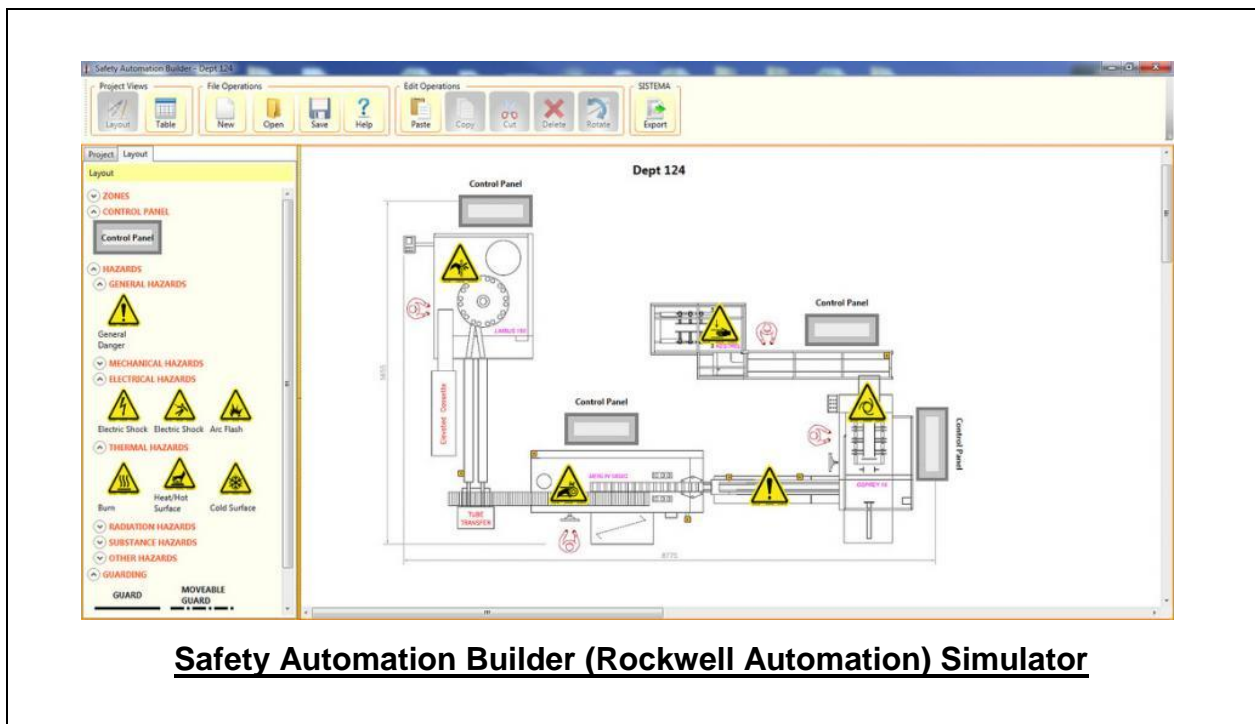


Day 5 Thursday 07th of November 2024

0730 – 0930	Practical Examples Determination of SIL by Risk Graph Method • Determination of SIL by Risk Matrix Method • Multiple Layers of Protection
0930 – 0945	Break
0945 – 1045	Frequently Asked Questions
1045 – 1230	Addendums Explosion at BP Texas City Refinery • Other Subjects
1230 - 1245	Break
1245 - 1300	Video Presentation CSB Report on Explosion at BP Texas City Refinery
1300 – 1315	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1315 – 1415	COMPETENCY EXAM
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the “Safety Automation Builder Software (Rockwell Automation)” simulator.



Safety Automation Builder (Rockwell Automation) Simulator

Course Coordinator

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